Toward a Consensus Historical AVHRR Reflectance Calibration

Personnel:

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Project Description

The Advanced Very High Resolution Radiometer (AVHRR) flying on NOAA and EUMETSAT polar orbiters has a long data record (1979-present); and with its global, daily coverage and moderately high resolution (1-4km) it can resolve many cloud and surface features. Unfortunately, sensor degradation and lack of on-board calibration for channels 1 (red) and 2 (NIR) require post-launch calibration efforts in order for these data to be useful for detecting long term climate change.

Although calibration research has been conducted since the early days of the instrument, there is still quite a bit of disagreement among the various published calibrations – on the order of 10%. This goal of this project is to study past calibration efforts, bring together current AVHRR calibration researchers, and design a set of guidelines for calibration that will bring differing methodologies within a 3-4% consensus. In addition, another goal of this project to generate a new version of the AVHRR Pathfinder Extended Data-set that benefits from the improved calibration knowledge.

Progress for Year 3: July 2009 – September 2010

The third year of this effort was a no-cost extension of the second year. This was needed due to delays in moving funding from NESDIS to CIMSS. The three months of effort were spent on correcting and resubmitting the manuscripts that were accepted for publication. In addition, we made one more version of the data set that includes our final calibration. This data was put on-line and will be delivered to NCDC as part of another effort.

IWe were also able to apply the techniques developed here to the 1.6 micron channel on the AVHRR/3 sensors (NOAA-16, 17 and METOP-A). While outside of the proposal, this result is a bonus and should be appreciated by the community Figure 1 illustrates an example of the application of AVHRR and MODIS simultaneous nadir overpasses (SNOs) to derive a channel-3a (1.6 micron) calibration. We have done for all available data.

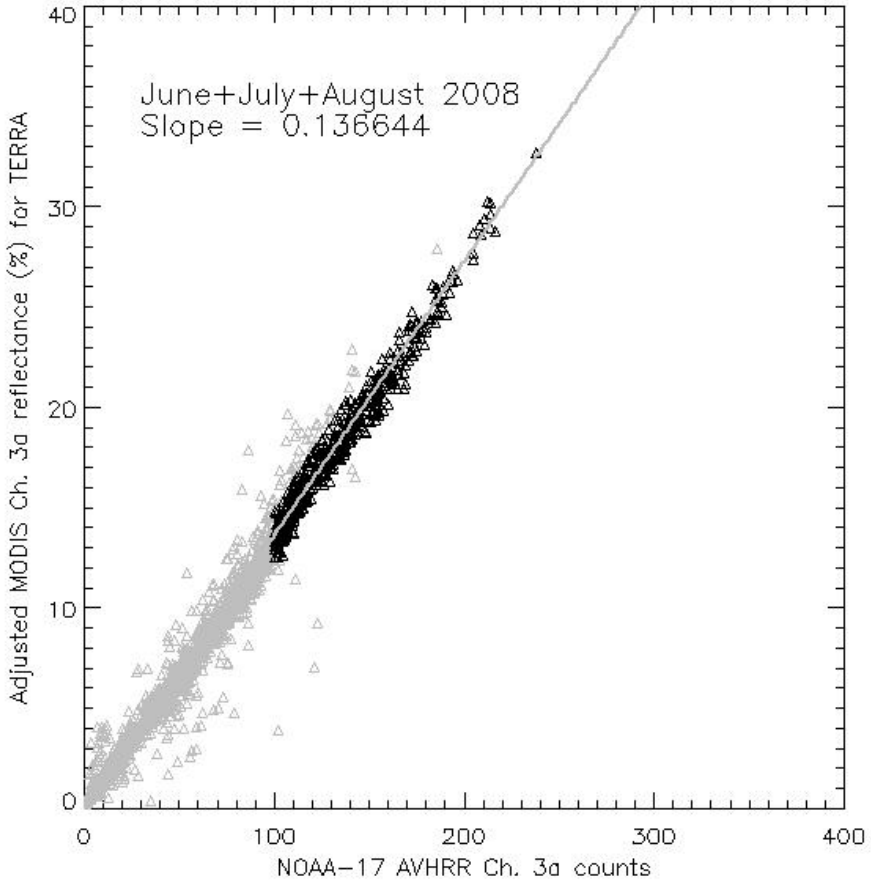

Figure 1 Comparison of NOAA-17 AVHRR Ch3a (1.6 micron) counts against MODIS reflectance adjusted to look like AVHRR during one month of SNO events.

Collaborations

Throughout the third year as in years past, we have been collaborating with colleagues in the community who are reliant on the information we are deriving. To date, the following groups have asked for and been given our calibration results.

1. The International Cloud Climatology Satellite Project (ISCCP)
2. The EUMETSAT Climate Monitoring Satellite Application Facility (CM-SAF)
3. Professor's Stefan Wunderle's group at the University of Bern, Switzerland.

In addition, this calibration information is being submitted for approval as Global Space Based Intercalibration Committee (GSICS) data-set. Also, we intend to brief the community on these results at the CalCon Conference in August 2010.

Future Work

We are highly appreciative of the support on this project and we hope our results will pay dividends on your investment.

Publications/Conference Presentations

Molling, C., Heidinger, A., Straka III, W., and Wu, X., 2009: Calibrations for AVHRR channels 1 and 2: review and path toward consensus. (In press to IJRS)

Heidinger, A., Straka III, W., Molling, C., Pavolonis, M., Sullivan, J, 2009: and Deriving an Inter-sensor Consistent Calibration for the AVHRR Solar Reflectance Data Record. (in press to IJRS)

Straka, W. A. Heidinger: A New AVHRR Reflectance Calibration. Presentation at CALCON, Loga Utah. August 23-25, 2010.